Chemical & Engineering NEWS

FINAL PROGRAM
ACS Kansas City meeting Page 26

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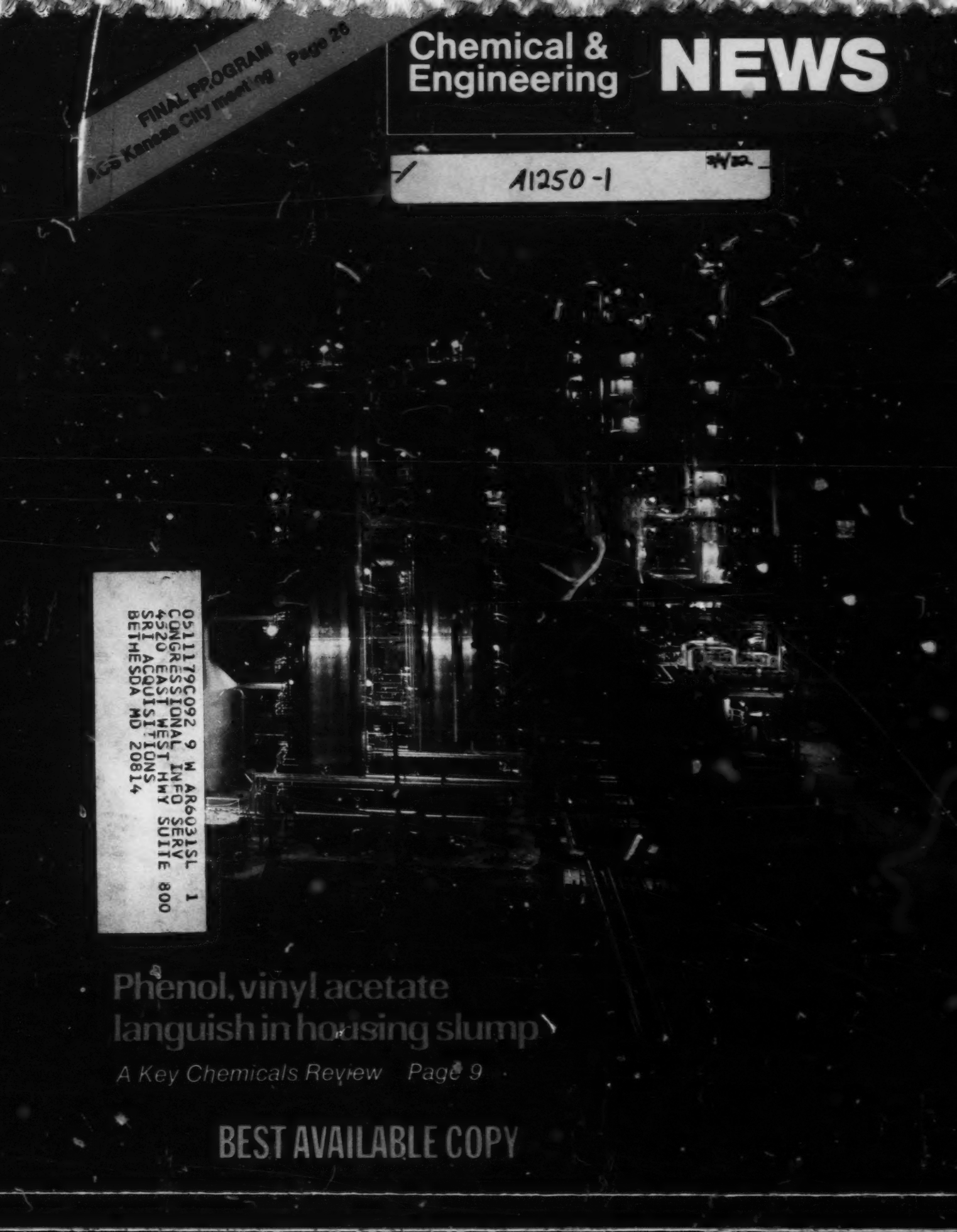

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Phenol, vinyl acetate languish in housing slump

A Key Chemicals Review Page 9

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Chemical & Engineering NEWS

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Phenol, vinyl acetate struggle through 1982

Recession has hurt both of these intermediates for adhesives; vinyl acetate shows more stability than badly slumping phenol

Bruce F. Greek
C&EN, Houston

Phenol and vinyl acetate both cost about 30 cents per lb in the real market, have their biggest use in adhesives, depend heavily on construction markets, and stop growing in recessions. They also are both organics, of course, with production close to 2 billion lb this year.

But that's about it for similarities. Vinyl acetate, the olefin, shows itself by far the sprightlier and stabler of the two, whereas phenol, the aromatic, careens through another of its market upsets in the wake of trouble in its dominant use in housing.

Key Chemicals

For all its ups and downs over the years, phenol actually has covered about the same net increase in value as has vinyl acetate with half the olefin's growth rate. From 1971 through 1981, phenol averaged a 4% gain in output per year, while vinyl acetate had one of the best records among major organics with 8%. Both more than quadrupled in price, reflecting the oil-price explosion.

For now, both likely will have the same or lower production in 1982 than in 1981. For 1983, prospects are for relatively small gains for each. Later, output for vinyl acetate could top its previous volume, but phenol's recovery will take much longer.

A close connection to housing and commercial construction largely explains why production of phenol and vinyl acetate peaked three years ago. Housing starts may total less than 1 million units for 1982, half the level of just a few years ago. High interest rates are the continuing problem. In the meantime, phenol and vinyl acetate cannot develop new uses in time to help near-term.

Of the two, phenol has the larger share of its markets in construction, especially residential and light commercial property. In addition, some of its other uses, such as carpets, are allied to construction.

The market slump for phenol and vinyl acetate is bad enough that plant capacity has been cut. Capacity has become marginal for various reasons. For example, in the case of Union Carbide's shut-down phenol plant in Puerto Rico, feedstock no longer is available from nearby Commonwealth Oil. One industry source points out that if phenol's selling price were a lot higher, Carbide might bring in raw material cumene from the U.S. and continue running the Puerto Rican plant. But phenol has been just barely profitable in recent years, hardly justifying the effort.

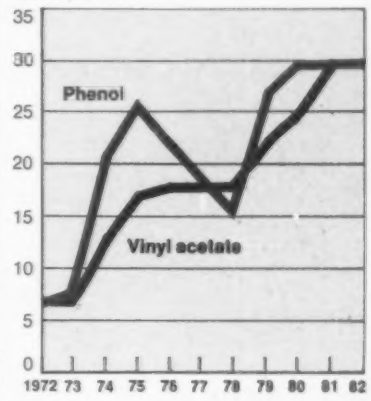
Similarly, Borden's acetylene-based vinyl acetate plant at Geismar, La., now shut down, probably was just barely profitable, especially in view of competition from newer technology.

For vinyl acetate, the shakeout in production capacity could be over, at least for a while. At the moment, four producers share the 2.3 billion lb of total capacity. All plants are large-scale, with none less than 400 million lb per year. Each is based on low-cost ethylene feedstock and uses up-to-date technology.

Phenol capacity, however, could drop even more and soon unless something unusual happens to boost demand. Several units have capacities of less than 100 million lb a year. These are operable, but not necessarily operating. Some of these units might be shut down if phenol demand stays at its current level of just over 2 billion lb a year. In essence, a second capacity drop of 400 million lb per year could occur. Even then, there would be little effect on profitability.

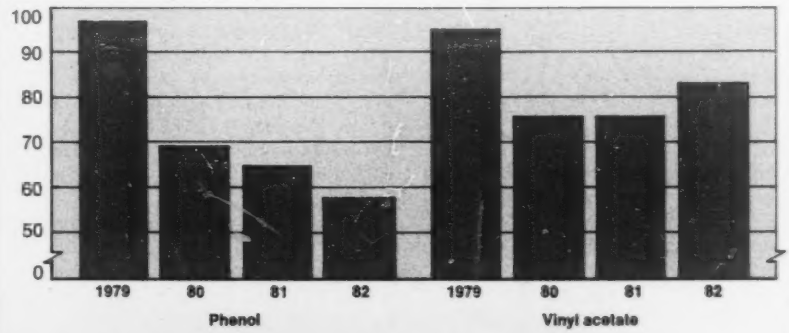
For the immediate market outlook in phenol and vinyl acetate, see the following pages.

Recession has halted real-market price rises



a Average real-market value. **Sources:** International Trade Commission, industry, C&EN estimates

Capacity use plummets for phenol, rises for vinyl acetate



a First-quarter nameplate capacity. **Sources:** International Trade Commission, industry, C&EN estimates

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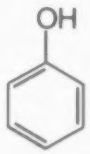
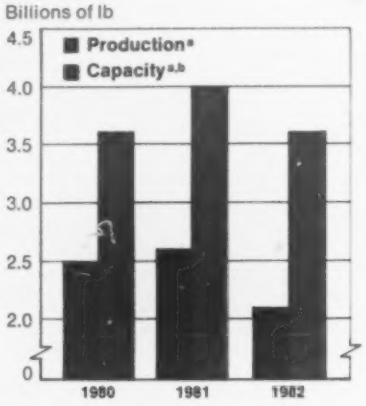
Key Chemicals

Phenol



- ***Production way off***
- ***Capacity cut***
- ***Prices discounted***

PRODUCTION/CAPACITY



a Synthetic only. b First quarter.

HOW MADE

Mainly peroxidation of cumene (isopropyl benzene) and cleavage to acetone and phenol

MAJOR DERIVATIVES (U.S.)

Resins (mostly with formaldehyde as comonomer) 40%, bisphenol A 20%, caprolactam 15%

MAJOR END USES (U.S.)

Adhesives 60%, plastics 20%, fibers 10%

FOREIGN TRADE

Exports—falling to 200 million lb in 1982, imports—negligible

PRICES

List prices 32.5 to 36 cents a lb

COMMERCIAL VALUE

$650 million for production, 1982

Phenol seems to be one of the ultimate commodity chemicals, a product that treats the ups and downs of the business cycle more like a roller coaster. Right now, phenol is screaming downhill. Output may be down 20% this year, prices are discounted more than 10% from list levels, exports are falling, and plants are shutting down.

Tracking the demand for plywood, phenol's largest end use as a binder, once gave joy to phenol producers, but not any more. With housing starts bumping along at low levels and fix-it work on older houses also down, plywood's plight now brings scowls to phenol producers' faces. The depression in housing means the same thing for phenol.

With the year half over, producers doubt that phenol production will top 2.1 billion lb in 1982, off as much as 20% from 2.6 billion lb in 1981. Even to reach 2.1 billion lb, phenol will need a pickup in the second half. For the first four months, annualized production was close to 2.0 billion lb, based on preliminary data from the International Trade Commission.

The path from phenol production to housing goes through a chain of phenol-formaldehyde resins to adhesives for plywood and for other competing board substitutes. More than 40% of phenol goes into these resins, and about 40% of the resins goes into plywood or particle board.

Besides board, an important use of the resins is as binders in glass-fiber insulation, various kinds of laminates, and other products used in home construction. These same materials also are used in commercial construction, which is declining in many areas. Clearly, construction of one kind or another determines how well phenol will do in any year.

Since construction has a history of sharp cycles, phenol producers are no strangers to stormy weather. Back in 1979, phenol production reached a record of almost 3 billion lb. But it dropped to 2.5 billion lb in 1980, edged up in 1981, and then nosedived in 1982. In the previous recession in 1975, phenol also was jolted for a 500 million lb decline.

Currently, one of the major cost problems facing producers is inefficient plant operating rates. For 1982, the average rate will be less than 60% of nameplate capacity. In 1981, the rate was about 65%.

The operating rate still is dropping despite a decline in capacity from a fire at Allied's phenol unit at Frankford, Pa., and permanent shutdown of Union Carbide's unit in Puerto Rico. These reductions have been offset partially by expansions now fully completed at General Electric and Georgia-Pacific. Industry sources estimate a net decline for 1982 of about 400 million lb.

With demand for phenol down so much, Allied has little incentive to rush repairs. Other producers have extended scheduled maintenance shutdowns of plants this spring in an effort to reduce inventories. Even so, phenol supplies are more than adequate for all markets, resulting in continued discounting of selling prices.

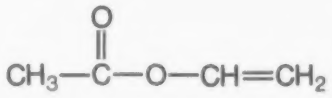
Except for minor uses, no phenol outlet will grow in 1982. Just as in housing, the recession and high interest rates hurt demand in autos and most other consumer durables. Phenol is hit hard in these uses in many ways. For example, when production of autos, farm machinery, and most other large-sized equipment declines, demand for castings drops and, with it, demand for phenolic resins for binders in molds and cores. With fewer castings to finish, demand for phenol resins used in making grinding wheels and other abrasive products drops at about the same rate.

Chemical derivatives of phenol also have stumbled in their growth as a result of the recession. Bisphenol A, 90% of which is further reacted to make epoxy and polycarbonate resins, has felt the effects. Caprolactam, nearly all of which becomes nylon 6 fibers and resins, has been hit by the housing decline because a big part of nylon 6 goes to carpets. Considerable growth in demand for phenol to make aniline had been expected this year, but after starting up its new unit to make aniline from phenol, USS Chemicals shut the plant down because of low demand.

An across-the-board demand slump, then, is phenol's lot in 1982. Until the big-ticket durables revive with the economy, phenol producers will have to try their best just to break even.

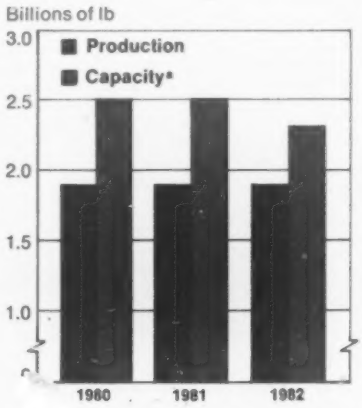
Key Chemicals

Vinyl acetate



- ***Demand holding***
- ***Capacity down a bit***
- ***Prices discounted***

PRODUCTION/CAPACITY



[a] First quarter.

HOW MADE

Vapor-phase reaction of ethylene, acetic acid, and oxygen

MAJOR DERIVATIVES (U.S.)

Polymers 55%, polyvinyl alcohol 20%, copolymers 15%

MAJOR END USES (U.S.)

Adhesives 35%, paints 25%, paper and textile coatings 20%

FOREIGN TRADE

Exports—holding at about 600 million lb in 1982, imports—negligible

PRICES

List prices 37.5 cents a lb; discounting relatively small

COMMERCIAL VALUE

$700 million for production, 1982

U.S. vinyl acetate producers may find themselves in a select circle this year—the fortunate makers of organic chemicals whose production isn't declining. There won't be many such chemicals. At that, vinyl acetate may just skin through by matching 1981.

If vinyl acetate succeeds with production of about 1.9 billion lb, the product will have extended a plateau for a third year since the 1979 peak of just under 2.0 billion lb. Ordinarily, three years of no growth would mean trouble for a chemical. But these days, with the recession in housing and automobiles taking such a toll, matching past years' production is an achievement.

An even greater achievement this recession year would be an increase in plant operating rates. And vinyl acetate probably will do it, but for a special reason—shutdown of old capacity. Borden Chemical's vinyl acetate unit at Geismar, La., based on acetylene, has not operated for some time, but it still has been included in C&EN's reckoning of capacity. With final shutdown of that unit, however, total capacity has declined on a nameplate basis to a bit more than 2.3 billion lb a year. This puts the average use rate for 1982 at 83%, up from 76% in 1981.

A bit more capacity, 100 million lb per year, will be completed this year by Union Carbide at Texas City, Tex. This expansion, the final phase of a two-part program, likely will be completed during the third quarter and be available for a small amount of production in 1982.

Vinyl acetate's enviably high plant operating rate admittedly might seem on shaky ground. So far this year, demand has been good enough that producers came within 20 million lb of 1981 production for the first five months, according to the International Trade Commission's preliminary data. However, vinyl acetate will have to survive a lot of pressured markets for the rest of 1982, including its important export business.

Exports in 1981 exceeded 600 million lb, just under 1980's level. Some industry sources expect exports in 1982 to drop at least 10% and possibly 20%. However, so far, exports have run at an all-time high of more than 650 million lb annualized from estimates for the first five months.

Perhaps later this year and in 1983, exports will decline as new capacity comes on stream overseas and antidumping duties bite. However, capacity often gets delayed in startup and frequently fails to produce in quantity or quality for some time afterward. Such difficulties would help U.S. exports, causing unexpected surges in monthly exports and upsetting forecasts.

Similarly, demand for polymers made using vinyl acetate as monomer or comonomer has been holding up better than expected. On the surface, the decline in housing should have hurt polyvinyl acetate because one of its major end uses is in paint. But several small factors combine to make paint use hold up. One example is capture of small amounts of the market from acrylics for cost reasons.

Adhesives uses, heavily dependent on construction, also apparently are holding up. Other adhesives-containing polymers of vinyl acetate go into a wide variety of packaging and auxiliaries such as labels.

Competition exists for most of the adhesive uses. However, for reasons of cost, convenience, and tradition, vinyl acetate-based adhesives are managing to hold on, expand slowly, and sometimes move into new applications.

Other polymer uses of vinyl acetate come through polyvinyl alcohol, made by hydrolyzing polyvinyl acetate. The largest use of polyvinyl alcohol is in textile sizes, particularly for those used on polyester-cotton blends. Again, cost-performance gives the nod to polyvinyl alcohol sizes over competing starch or acrylic acid-based sizes.

Remaining markets for vinyl acetate are a bit smaller and are suffering in some cases. Polyvinyl butyral goes mainly to lamination of glass, hurt on one hand by the decline in auto production but helped on the other by growth in architectural use of glass. Copolymers with ethylene and vinyl chloride go into a host of adhesive, coating, film, construction, and other uses. None of these have demand swings large enough to have a major impact on vinyl acetate consumption.

The net result of vinyl acetate's far-flung use pattern is just the opposite of phenol's much narrower spectrum—stability in a turbulent year.

NOTE

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